TESTING USER EXPERIENCE IN TABLET GAME GRAPHICS

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ABSTRACT

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As playing games has grown more popular than ever and the market is oversupplied by different games, it has become increasingly important to stand out in the competition. One way for game companies to do this is to concentrate on offering the players great usability and user experience. The purpose of the thesis is to find out how game graphic artists can enhance the user experience in games and increase the playability with their graphics.

One of the fastest growing fields of games is mobile games, especially for tablet devices. This thesis concentrates on gathering information about tablets, tablet users and specific graphics needs for tablet devices. On the basis of this information, graphics for a tablet game project, Crashnastics, were created.

To test the graphics of Crashnastics, user playtests were organised. The data were collected via analysing the play sessions and interviewing the test subjects. The interview questions were compiled from the perspective of a graphic designer to find out if the graphics met the goals they were set to meet. The main goal of the tests was to define if the graphics of the game were able to create a user experience they were designed for.

The playtest sessions with interviews proved out to be a good combination for finding the user experience problems and successes in the graphics. The data gathered in the tests confirmed the right choices and also brought forth problems in the graphics of the game and gave good guidelines for future development.

Key words: game graphics, play testing, tablet, usability, user experience.

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ABBREVIATIONS AND TERMS

Gamer	A person who plays video or mobile games.
Free-to-play	A game that is free-to-play is free for downloading and can offer a significant portion of the content for free. The entire game can also be free, but offers opportunity to pay to make the game experience more enjoyable.
Platformer	A game in which the player guides a character to jump between platforms and/or over obstacles to advance in the game. Classic examples of a platformer are the Super Mario games.

1 INTRODUCTION

Games are an expanding and growing multibillion industry and have witnessed many success stories in recent years. The increase of digital distribution of games has lead to growth of small independent game companies and entrepreneurs. The supply of games on the market has grown to be massive and hence it has become more and more difficult for game companies to stand out and make a breakthrough. This increasing competition has driven game developers to invest in usability and user experience in their games. Guaranteeing an enjoyable and smooth game experience gives them a competitive edge and helps to stand out in the vast market.

Mobile games have become more popular as everyone owns a gaming device - their smart phone or tablet. In recent years tablet computers have grown increasingly popular and consequently playing games on these devices has increased. It is important for game designers to understand the specific requirements of these devices so they can make their games as enjoyable as they can for the player. Since Apple and its iPad conquered the markets in 2010, users everywhere have gotten used to devices that are efficient and fluent to use. Games played on these devices, regardless of the tablet manufacturer, should also be enjoyable, playable and offer players great entertainment experiences.

In my thesis I concentrate on the role of a graphic designer in maximizing the playability and fluent flow of the gaming experience on tablet devices. To set the grounds for my research I explore what are the pros and cons of tablets as gaming devices, and who plays games on tablets and how. I look into the special requirements of tablets when it comes to designing graphics for games. To test the usability and user experience of graphics in my tablet game project *Crashnastics* I perform user playtesting and interviews. On basis of the results of these tests I can identify the problems and usability issues in my graphics and find ways to improve them.

2 TABLET AS A GAMING PLATFORM

A tablet computer is a general purpose portable computer with a touch-screen-display usually operated with fingers or a stylus. A keyboard is replaced with an on-screen virtual keyboard and functions of a computer mouse can be performed by gestures, like swiping and pinning with fingers. Possible features include a camera, a microphone and an accelerometer. Tablet computers are available in different sizes depending on the manufacturer and model. (Techterms 2011.)

The first tablet computer to be directed towards consumers was introduced already in 1989 (Atkinson 2008, 17), but the first commercially successful tablet to reach wide audiences was the iPad, brought to market by Apple in 2010. After the release of the iPad, the number of tablet users has rapidly increased. Gartner (2014) predicts that tablet sales will reach 250 million units during 2015. Apple will still be in the leading position with close to a quarter of the market share (IDC 2014).

Tablets can be categorized according to the three biggest operating system they run on. Android, which is currently developed by Google, runs on several different tablets, biggest manufacturers being Google itself and Samsung. IOS (the name stems originally from iPhone operating system) runs only on Apple tablets, which are iPads. Windows runs on tablets manufactured by Microsoft and many others. Several hardware companies have build hybrid devices with the possibility to work with both the Windows 8 and Android operating systems. Some manufacturers, for example Sony, Dell, Asus, Acer and Toshiba are not dedicated to offer tablets for only one operating system.

2.1 Popularity of tablets and mobile gaming

As tablets have grown more common so has their popularity as gaming devices. According to a study by Frank N. Magid Associates (2013a) 51% of Americans own a tablet and the percentage was expected to rise to 64% during 2014. Approximately one-third of Americans age 13 and older play video games on their smart phones, tablets,

and portable gaming devices (ESA 2014) and according to a study by Google (Müller, Gove & Webb 2012, 4) 51,1% of tables owners use their tablet for playing games. Newzoo (2014) estimated that the global mobile game revenues would reach 30 billion dollars in 2015, of which tablets take a share of 10 billion dollars. That puts mobile games on track to replace the traditional console market as the largest game segment by revenue (Newzoo 2014).

Mobile game industry is highly competitive with a vast range of games available for the user. The main mobile application (app) marketplaces are Apple's App Store and Google's Play Store. In Apple App Store games is the biggest category with 21% of all the active apps. In the beginning of January 2015 there were over 300 000 active games available for download from App Store alone and there are hundreds of new games being added every day. (PocketGamer 2015.) At the same time Google Play store has over 250 000 downloadable active games on the market (AppBrain 2015). These figures show that the game market is a remarkable part of all apps available for consumers and the number of available games does not seem to be decreasing in the near future.

2.2 Tablet gamers

When games made their breakthrough to mobile devices like smart phones and tablets, they reached wide audiences in all age groups (figure 1). Mobile gaming is most popular with 20-35 year olds, but the growth is fastest in the higher age brackets (Newzoo 2013). According to Dr. Heather Nofziger (2014), EEDAR's head of survey research, mobile platform is the most accessible and welcoming platform on the market and has attracted a wide market as it requires devices that people probably already own. The gender split has nearly reached parity with mobile gamers as 45% are female and 55% are male.

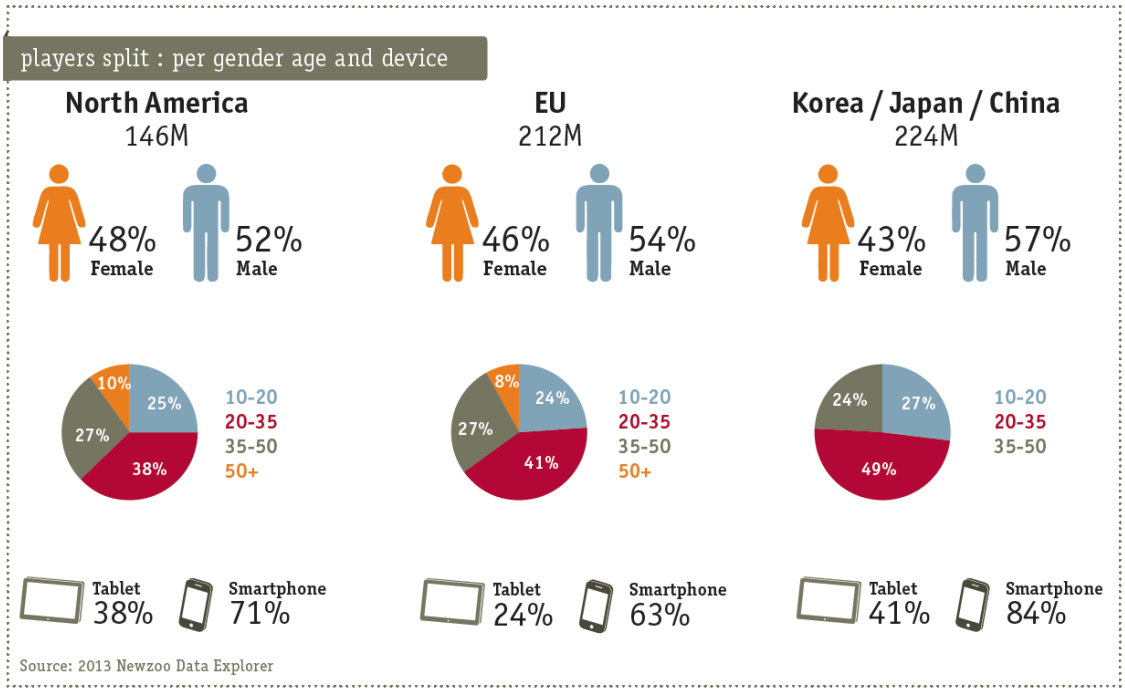


FIGURE 1. Worldwide age distribution of mobile gamers (Newzoo 2013)

Users do not perceive tablets as mobile as their smart phones and do not carry them around as much. They do not perceive them as personal either and tablets are often shared with the whole family; with the spouse and children. In this way one tablet can have several users. The most common use environment for tablets is home; couch and bed being the most popular places to use tablets. (Salesforce 2014, 6-7; Müller et al. 2012, 5.) This implies that tablets are typically for casual and entertainment use. The claim is verified by a study by Peter Farago (2012) which researched how people use their time when using tablets. It shows that 67% of the time was used playing games, which is 71% more than on smart phones (figure 2). It seems that smart phone usage is more task oriented with checking email, sending messages and chatting, as tablets are used more for entertainment and leisure, like playing games and watching series or movies.

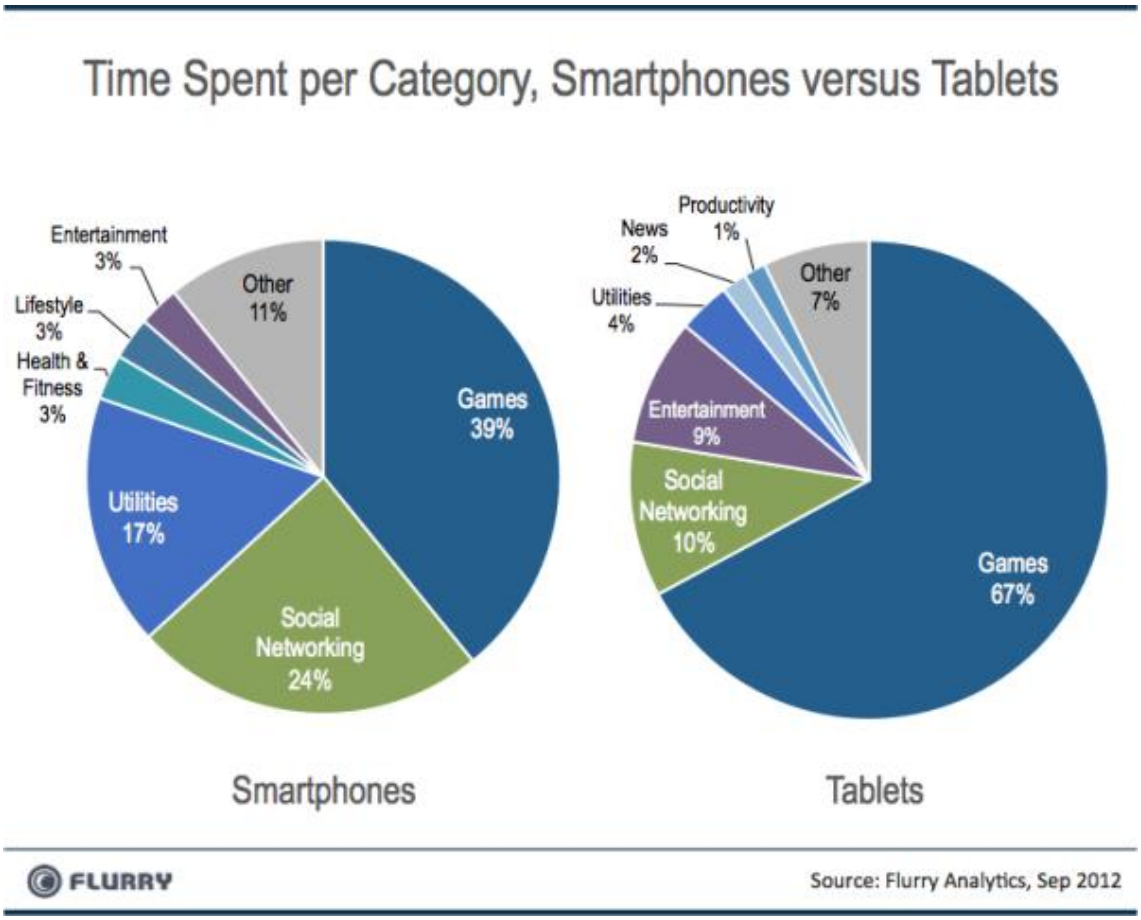


FIGURE 2. Time spent per category (Farago 2012)

According to a study (Farago 2012) tablets are used only short periods at a time. This supports the claim that tablet players are more casual than hard-core players who can spend several hours on a game session. With tablets the sessions are shorter; according to a study it lasts approximately 8,2 minutes (Farago 2012). It is easy to just turn on a tablet, play a while, and then turn it off again.

When it comes to usability, the user is in the center. It is very important to understand the user and the environment - who play mobile games, how and where. All these things need to be studied to reach the best possible user experience.

2.3 Mobile game development opportunities and challenges

2.3.1 Opportunities

The world has witnessed such Finnish mobile game success stories as Rovio's Angry birds and Super Cell's Clash of Clans. They have significantly increased the popularity and interest towards games and game industry. There has also been success stories with games made by only one or two persons, in Finland and globally. These successes have motivated many to gravitate towards game education. It seems that sky is the limit for success and the possibilities are endless, and that is one of the reasons why game development industry is growing fast and luring more and more game makers. Developers are coding away dreaming of becoming the next Candy Crush Saga or Flappy Bird - the next big hit. Appreciation of games has also risen and many think of games as an art form, not just a form of entertainment and leisure, and realize that the game industry can be a very lucrative business.

The vast amount of games and their rise in popularity can be explained by the fact that they are relatively easy to get to the market and it is also easy for the consumers to access the games. Also majority of mobile gamers seem to enjoy simpler games than hardcore console or PC gamers. Therefore the games targeted for these casual players tend to be simpler and don't require massive teams and funding for development.

The relative easiness of making these simple games and getting them to the consumers has lead to arising field of indie game development in the mid 2000’s. Indie games are independent video games that are created by individuals or small teams usually without a video game publisher's financial support. Of course there are also big budget games for mobile devices, but they are in the minority.

To get a game to the app market, game developers do not need a publisher - anyone can publish an app or a game. Game consoles are closed systems, and developing for them normally requires a license from the manufacturer. Mobile game developers do not need to buy a specific device (development kit) for developing their game whereas when developing games for consoles it is essential. Unlike console game developers, mobile

game developers can test their game on the same common devices that are also used by the consumers.

2.3.2 Challenges

The amount of games available for the consumers leads also to one the biggest challenges mobile game developers are facing at the moment; how to stand out in the oversupplying market. This is especially challenging for the indie developers as they typically do not have as much money budgeted for marketing as the bigger game companies. Even if a mobile game publisher makes a quality game that is different from the others, new and innovative, it does not guarantee it will make the invested money back. Many good and promising games get lost in the crowd. It is important to make a marketing strategy and keep in mind the target audience. The game should be offered to the right people with the right message at the right time through the right distribution channels. Times have changed since 2009 when Angry Birds made its breakthrough and it is increasingly difficult to get through to the players.

In addition to the fact that it is difficult to stand out, Appia (2014) points out operating system fragmentation as a challenge for mobile game developers. There are several operating systems on the market and inside those systems are several different versions in circulation and new ones being published all the time. It is hard to keep up and have your game running on every one of them. There are also many different mobile device manufacturers with different features from keyboards to buttons, and different screen shapes and sizes. One solution to this problem is to do market research and learn which operating systems and devices are newest and most popular and develop the game for them, and expand later if necessary. However, developers should not ignore the older devices or operating systems if they are still widely used. Thorough market research can save game developers from many difficulties and pitfalls. (Appia 2014.)

One of the challenges in mobile game development is created and sustained by game industry itself - free-to-play games. Free-to-play refers to a game that is free to download and play, but makes it revenue through adverts, micro payments (for example pay to get extra lives or boosters to make the game easier) or paid extra content

(Techopedia 2015a). Because of the popularity of these free-to-play games, it is very easy for the player to try out several games and only invest time and money to the ones that are most enjoyable. That also makes mobile gamers very flickering; if the game does not convince them in a couple of minutes it is effortless and carefree for them to move on to the next game, because they did not have to invest any money and only a little time in it. Therefore it is crucial for the game to be compelling from the very start, especially when it is free-to-play. The situation is very different with console or PC games. When the user buys an expensive game, he/she is stuck with it and will play it even if it is not fulfilling all their demands. (Luban 2011.)

2.4 Tablets vs. smart phones

There have been many studies concerning usability of games for mobile phones, but not that many especially for tablets. Tablets seem to land somewhere between mobile phones and desktop computers, and consequently the user research on those devices can both contribute when usability of tablets is examined. Even though phones have smaller screens and the hardware is not as good as in tablets, there are also similarities like touch screens and mobility.

In recent years tablets and phones seem to be getting closer to each other when it comes to their size and features. Manufacturers offer smart phones with larger screens and better hardware, and smaller versions of tablets, for example iPad mini, are sold on the market. The devices that fall in between, having larger screen than smart phones in general and still function as phones, are called phablets - half-phone, half-tablet (Rogowsky 2014) (picture 1). Phablets have grown more popular during the past two years and Business Insider predicts that by 2017 phablets will outsell smart phones (Danova 2014). Consumers like to minimize the number of devices they use when it is made convenient to them. When updating their tablets they are more likely to update to a phablet - killing two birds with one stone and updating their smart phone and tablet in one go (Gartner 2014).

PICTURE 1. Size differences between smart phones and tablets (Mytechknowspace 2014)

When it comes to gaming, users are preferring tablets over smart phones. Tablets offer better experience for mobile games; they have larger screens that are more responsive and have higher quality hardware. (Frank N. Magid Associates 2013b.) Because of the large screen size it is easier for the player to hit the right targets with their fingers so the user experience is more pleasant than with mobile phones. The large screen also benefits graphic designers as it is possible for them to provide graphics with more detail. Because of the better hardware and shorter loading time, more technically laborious hence more impressive graphics and animations can be utilized. Tablets are also more suitable for several users at the same time being better for local multiplayer gaming.

Nonetheless tablets are not always more suitable for gaming, it depends on the environment and situation. When playing games with smart phones the advantages are the lightness of the phone and also the small size. It is easier to carry around and fits in one hand. Most of the tablet models need to be supported with both hands.

Classic mobile game Fruit Ninja, developed by Halfbrick Studios, is a good example of a game that works best on tablets. In the game the player slices fruit thrown in the air with their finger acting as a blade and avoids bombs that are mixed among the fruits (picture 2). When comparing the playing experience between the mobile and tablet versions, the advantages of the tablet become clear. As the screen is bigger, it is easier

for the player to hit the targeted fruits and avoid the bombs. The actual movement of the finger is wider and it enhances the slicing movement, whereas on a mobile phone the movements can be inaccurate and small. When the player is slicing the fruit on a tablet screen, the hand of the player is hiding smaller portion of the screen as with a smaller phone screen and it is easier to see where to slice. Because of the larger screen size, Halfbrick Studios developed one-on-one match mode between two players for the tablet version. Needless to say, the crucial slicing experience would not work even closely as well with a mouse or a console controller.

PICTURE 2. Screen capture of Fruit Ninja gameplay on iPad (Iphoneate.com).

Above mentioned example summarizes the advantages of tablet over phone as a gaming device: larger screen size, possibility for more detailed graphics, larger visible game screen while tapping or swiping, more accurate tapping, and enabling multiple simultaneous players on the same device. The downsides for tablets are the inferior mobility compared to smart phones, tapping is not as accurate with a finger as a mouse cursor, and it has no physical buttons.

When designing a game specifically for the tablet game market, designers should utilize and emphasize the unique aspects and potential of tablets, the things that make them

differ from mobile phones, desktop computers or consoles. Games for tablets do not need to be scaled up versions of smart phone games or scaled down from console or PC games.

3 USABILITY IN GAMES

Games are often compared to other entertainment like movies, TV, or even music, but games add another dimension that these other forms of entertainment do not have - interaction. Whenever interaction between a user and a product is concerned, usability comes into play. Jacob Nielsen (2012) defines usability as a quality attribute that assesses how easy user interfaces or products are to use with five quality components: learnability, efficiency, memorability, errors, and satisfaction. That is, how easy the product is to learn, how quickly can the tasks be carried out, can the use patterns be easily recollected, how many errors are made while using the product and can they be easily recovered from, and how pleasant it is to use the design. (Nielsen 2012.)

A term often used when discussing game usability is **playability,** meaning the ease and fun of playing the game - the overall quality of the gameplay. González Sánchez, Padilla Zea and Gutiérrez (2009) argue that the concept of usability needs broadening and deepening as it is not sufficient to describe the full user experience in relation to games, as games are meant to provide enjoyment and entertainment. In addition to Nielsen's quality components they present immersion, motivation, emotion and socialization to be added in the tools of defining playability. In other words, does the player believe in the game contents and is he/she involved in it, is the player motivated to overcome the challenges the game offers, does the game evoke emotions and feelings, and is the social dimension of the game satisfactory. (González Sánchez, Padilla Zea & Gutiérrez 2009.)

Usability is important for games and needs to be taken into account in game development, because no one wants to play games that are frustrating or difficult for the wrong reasons. In the end, playing games is always a voluntary act of leisure and if the experience of playing a game is not satisfactory, it is easy to just stop it and do something else. Especially in games, usability is about delivering a better and deeper experience. Even the slightest interruptions, errors, unintended challenges, glitches and hiccups can turn the game into an annoying experience. (Laitinen 2005.) Melissa Federoff (2002, 8) points out that efficiency is not the main purpose for games, but

satisfaction in the gameplay is the most important quality attribute when it comes to user experience in games.

The key to success is to find the right amount of challenge that is not frustrating, but fun (Laitinen 2005). It depends on a game what can be considered to be fun. Some games, for example platformers, are fun when some difficulty and challenges are involved, because playing the game needs to be awarding and have a sense of accomplishment. Some other games, for example heavily story driven games, do not have to be challenging, but offer a pleasant and easy way to enjoy the journey through the story.

Good usability is especially important in big production complex games, with many different menus to interact with, but it is also important for small casual mobile games. In the other hand, some usability mistakes can be dismissed and ignored in the massive games, like a drop in the ocean, but in smaller games they can be a deal breaker. Bad usability will eventually affect the sales of the game and the reputation of game company negatively. Great usability can make the game stand out in the vast market. (Laitinen 2005.)

As games have grown more popular than ever, so has the importance of good user experience. Games are more accessible for everybody and the people who did not play any games 5 to 10 years ago can now be the big spenders and active gamers. As Laitinen (2005) points out, these newcomers are not familiar with the conventions and common pitfalls of gaming. Maximizing the learnability and ease of use is particularly important for these users.

3.1 Usability research methods in games

Games user researcher Steve Bromley (2012) states that over the recent years usability testing has become a norm in the game industry. The usability testing methods are roughly the same in game research as in other fields of research. It is not preferable to concentrate on only one of the methods as they complement each other. For example a good combination is conducting user play testing and expert evaluation: the developer gets the insight from the actual target group as well as usability experts. (Bromley

2012). When usability testing is started early in the game development process, the errors and bugs can be fixed earlier and more cost efficiently (Dobson 2011).
It is also very beneficial to conduct a larger scale testing to gather statistically valid data (Bromley 2012). The replies can be gathered for example via internet surveys or sharing the beta version of the game and asking feedback. With smaller unknown indie companies this can be difficult to implement as they might not be able to attract enough repliers. Another usability research method widely used in game industry is expert evaluation, where usability experts review the game, search for potential usability problems, and report the findings (Laitinen 2005).

3.1.1 User play testing

With games, usability testing with players who represent the target group has become a fundamental process in game development. The basic goal of playtesting is to improve the game by watching new users play it. It is recommended to record the sessions on video, so the data is easier to access by anyone on the development team and analyze later. Play testing should not be confused with bug testing, although some errors in the game are potentially found. The designers should focus on what works and what does not work in the gameplay. (Urbain 2008.)

In big game companies user tests can involve hundreds of testers and include paid in-house testers, volunteer consumers or both (Urbain 2008; Collins 1997). In smaller companies the scale is also smaller and games are tested with fewer users. There are also companies that offer their usability and playtesting services, but are often expensive. Especially for indie developers, it is crucial to conduct the testing themselves. Even one developer can collect large amount of data: Jon Grall (2015) sat in Department of Motor Vehicles waiting room, where there were hundreds of people waiting their turn with nothing to do, and offered them to kill time and play his game. He got a lot of valuable data from people with different backgrounds, of all ages, quickly and cheaply. (Grall 2015.)

It is important to make the testing environment as comfortable and relaxing as possible. For example a sofa makes a room more homely and reminds players of a living room,

where games are often played in normal conditions. Homely atmosphere is helpful as the test players can be nervous and disoriented, since they are having their every expression, movement and mistake monitored. It is important to brief the testers and emphasize that critique will not insult or hurt the feelings of the game developers; on the contrary, that is what the test is all about. (Urbain 2008.)

It is important to start the user testing early on, but in some cases the users can not be shown an ugly demo with jagged animations or temporary graphics. If this early unfinished version is shown to the testers, the feedback will most probably not target the real problems and the energy is wasted on reports about the appearance of the game. One way to test a game early on is to do a vertical slice of the game: a small portion that is polished to look nearly or as good as the finished product. (Bromley 2012.) This way the testers will not pay attention to the wrong things and can find the usability problems that matter in the end.

According to game designer Bruno Urbain (2008) early testing can be carried out with incomplete graphics if the play testers are correctly briefed. When the testers are explained what exactly they are testing, they are more likely to overlook such things as graphics and evaluate instead the gameplay or fun potential (Urbain 2008). Jeanne Collins (1997) argues that the game needs to be stable enough that the play testers do not spend too much time noting operational bugs, yet immature enough that changes can still be made to it.

4 TABLET GAME GRAPHICS

4.1 Usability

4.1.1 Graphic designers role in game usability

Principal designer Katja Leinonen (2015) says that the role of a graphic designer is a visible part of the user experience and therefore essential. A game that has gorgeous graphics, but the user interface is not perfect can be more popular and do better than a game with great usability but poor graphics. Leinonen emphasizes that games are all about creating experiences and different atmospheres. The goal in games is satisfaction, compared to for example an online shop, where efficiency and convenience of shopping is the main goal. (Leinonen 2015.).

The game has to look and also feel good: animations need to be fluent, colliding with or hitting objects need to be convincing, collectables need to have that alluring glow or shine so collecting them feels rewarding, the bullets need to pierce the objects convincingly, the blade should slice the fruit deliciously - to name a few examples. The list of things to take into consideration is endless. The question is how the graphic designer can enhance the game experience and satisfaction with graphics?

Satisfaction does not simply mean beautiful graphics. The graphics can be breathtaking, but not usable. The player might be satisfied by the looks of the game, but usability of graphics mean much more. If the player cannot tell the difference between a threatening and a friendly character, despite how skillfully they are drawn, there is a problem. In this sense other usability aspects, like learnability and memorability, should not be dismissed. Nonetheless, in addition to satisfaction, two of the four added attributes - immersion and emotion - are the key factors when defining if game graphics are usable.

The graphic artist needs to design graphics that help the player get immersed in the game and make the game world believable. Immersion happens when the player perceivers the game contents as 'real' in the sense that he experiences a sensation of being part of the game world and in it. The player is immersed when a mental model of

the make-believe world is formed by looking at various factors, like images, movement and sounds. When designing graphics the game artist needs to remember that even the slightest inconsistency or anomaly can break the illusion. Dealing with a familiar environment helps the player to get immersed easier as he/she does not need to pull out of the game world to think about it. A graphic designer can use stereotypes to assist in the immersion. To ease the immersion, the game character and objects need to look believable and like the player would expect them to look. (Madigan 2007).

Immersion is always a choice. A player can decide if he/she wants to be immersed in the game or not. Immersion can happen even if the graphics are poor, but the player has played the game enough to be immersed for example in the storyline. Nevertheless, graphics are an important part when it making the immersion easier. Players who are immersed in the game also tend to enjoy it more. (Madigan 2007). Deep immersion leads to motivation. If the player is interested in the game and wants to play it, he/she is motivated to carry out the tasks the game provides.

It is important that the graphics evoke feelings and emotions that they are meant to evoke. For example a ghost that is meant to scare the player and cause fear should not be funny and cause laughter. Basic things like shape, size and color can evoke different emotions and feelings. Sharp shapes can be perceived as hostile while round shapes can be perceived as friendly. Warm colors can be conceived as comforting and cool colors can be calming. Shape, color and size can be combined in endless number of ways to evoke different emotions and feelings. How things are perceived depends also on the culture and background of the perceiver. Psychology of graphic design is a research field of its own and the complex methods of creating emotions are not covered in this thesis.

The principles of graphic design are the same regardless of the game platform and eventually the end results depend on the skills and knowledge of the artist. In the other hand it comes to taste and opinions, and that is why the graphic designer needs to also remember the genre of the game and preferences of the target group. Even though this thesis focuses on the role of a graphic designer, an enjoyable gameplay consists of the effort of multiple professionals working together. The outcome of a game depends also

on the designers, producers, programmers and audio designers. Each of them is a piece of the puzzle and supports each other in maximizing the gaming experience.

4.1.2 Testing usability of graphics

User Experience designer Olli Hämäläinen (2015) points out that graphics are difficult to test as graphics and aesthetics are in some sense always subjective opinions and heavily culture specific. Everyone observes and processes the visual world around us differently.

Visuals cannot be directly measured or timed, but it is possible to do comparisons between different visual styles. Usability of graphics can also be timed, if there is for example a graphical element the user needs to recognize or find as quickly as possible. (Hämäläinen 2015.)

Leinonen (2015) points out that opinions can also be surveyed and used as guidelines when designing graphics. She states that in graphical interfaces the graphics and the interface are so tightly mixed together that it is hard to separate them and test graphics separately.

Even though usability testing is recommended to be started quite early in the development cycle (Kuniavsky 2003, 260), with game graphics the situation is different. There is no point in testing graphics that are incomplete and the main elements should be close to finished.

4.1.3 Testing graphics usability in Crashnastics

To find the practical usability problems in the graphics of Crashnastics it is crucial to include play testing in the test process. I think that play tests are still not enough to find all the problems and if the graphics have succeeded in evoking the emotions and feelings they intended. As visual preference is a matter of an opinion, I decided to test the graphics of Crashnastics through interviewing the test players as well. I think play

tests can only scratch the surface of what the players think of the graphics of the game and interviewing them will help me to find more specific opinions. I believe the level of the immersion can be seen while the test subjects play the game to some extent, but interviewing will support the observations and maybe give some additional information.

In my project Crashnastics the game world is a circus arena. To make that clear to the player and ease the immersion, it is good to include circus themed stereotypes in the graphics. For a graphic designer it is important to do background research before starting to plan the graphics so it is possible to get the atmosphere and details right. After researching the visual cues that will make the players associate the game world with a circus arena, I will need to pick the ones that are useful in the game.

Due to time constraints I will not have time to do different versions of the graphics for the test players to compare. That means I will rely on my skills as a graphic designer to create graphics that evoke certain feelings. The tests will prove if I got it right the first time or if I still need to do some changes in the graphics.

4.2 Special requirements

The specifics of good game graphics have been widely researched before, so I am going to concentrate on what a graphic designer should know when doing graphics especially for tablet games.

4.2.1 Designing graphics for different resolutions and screen sizes

As mentioned in chapter 2.3.2, device and system fragmentation brings its own challenges to mobile game developers. From a graphic designers point of view the challenge is how to make graphics that are suitable for different screen sizes and resolutions efficiently as possible. Making different size graphics for every device is a possibility, but in most cases out of the question as it is time consuming and therefore expensive.

A great solution for the problem is to make the graphics with a safe zone in mind and create a background that looks fine on all devices when centered (Wenderlich 2012). The safe zone should be in the aspect ratio of 3:2 as it fits inside the two other extreme ratios 4:3 and 16:9 (V-Play 2015) (figure 3). Aspect ratio refers to the ratio of the image width to the image height. All items and elements crucial to the gameplay should be placed inside the safe zone.

(FIGURE 3.) Example of a game background drawn to support different aspect ratios. Green borders present the safe zone and also aspect ratio of 3:2 (V-Play 2015)

However, all user interface elements, for example menu buttons or score number, should be anchored absolute screen size and not the safe zone (figure 4).

FIGURE 4. User interface elements are anchored to top and bottom of the absolute screen, not to the safe zone (area with white tint) (V-Play 2015).

When designing graphics, graphic designers should also keep in mind high density and Retina displays, which are a relatively new thing on tablets, but are becoming more and more common. Retina is Apple's brand name for double-density screens, but other manufacturers are creating similar displays. For example Apple's iPad 2 has a resolution of 1024×768 pixels, but newer iPad 3, which has a Retina display, has doubled the resolution to 2048×1536 pixels. Graphic designers should take note of the newest devices and biggest resolutions on the market, because scaling down graphics is always easier than scaling them up.

One thing a game artist should consider is SVG graphics, meaning scalable vector graphics. Graphics drawn with vectors are transformed into mathematical functions and can be scaled to any size. Vector graphics always look good and sharp and not blurred or pixelated, which could happen when scaling PNG pictures. This way there is no need to create multiple images for normal and HD displays. (Schroeder & Broyles 2013.) SVG graphics are not always the best solution and do not work for example with realistic looking graphics. They are best used in games with cartoon style like the example in figures 3 and 4.

4.2.2 Designing graphics for touch screen

Touch screen devices are used with fingers and that causes an issue of accuracy. Read-tap asymmetry (RTA) means that a user can see small things, but only touch big things. For example content can be large enough to read, but too small to tap successfully. (Nielsen 2011.) In graphics for touch screen, elements need to be big enough to touch. Smartphone manufacturers recommend the minimum target size to be from 26x26 pixels to 44x44 pixels. Even though these recommendations vary they are not close to an actual human index finger size, which is 45-57 pixels wide. If the target area is too small, the finger covers it and the user can not see any visual feedback of the touch. The time to hit the target is also longer when the target is smaller. If these targets are grouped close to each other, it is even harder to hit the indented target accurately. (Anthony 2012.)

Sufficient target area is more of a challenge for smart phones than tablets, because in phones the available screen size is smaller. When designing graphics for tablets it is easier to fit finger-size target areas in designs. One thing to take into consideration is with which fingers do the users use the application or play the game. For games it can be useful to consider thumbs, with width of 72 pixels, as a target size. (Anthony 2012.) For a game graphic designer target area size is important. Especially in fast paced games inaccuracy can be very frustrating and having to concentrate too much on hitting the right target can ruin any game experience.

Another example of differences between fingers and mouse as a control mechanism is mouse over, which means a graphical element that is activated when a mouse cursor hovers over it, but does not click it. A situation where mouse over is useful is when it is implying what the user might want to click. For example in a row of buttons the one targeted with the cursor lights up and helps the user to hit the right button. Another usage of mouse over is tooltips; when bringing the cursor over an element a textual hint or tip pops up. (Techopedia 2015b.) These visual cues to indicate a possible interaction or to show further information, is not available for touch screens as they do not support hovering. Graphic designers need to find other ways to execute these features or avoid them completely. Apple has used the method of clicking once to activate hover and click again to activate the element (Creativebloq 2013). Hovering is not crucial in game

graphics and more of a problem in web design. To avoid hover altogether might be better than confusing the users with complex actions.

Gestures are commonly used in touch screen applications and games. User can perform gestures like tapping, pinching, unpinching, dragging and swiping, and they can be performed with one finger or multiple fingers or even both hands simultaneously. In games using gestures can be a great addition to the user experience or a core mechanic, like in Fruit Ninja. (Torbochkin 2013.) For graphic designers point of view gestures can help to hide or discard some UI elements and in that way decrease the clutter on the screen. Some visual cues can also be needed to hint when and where the gestures can be performed. (Joos 2013.)

4.2.3 Physical restraints of tablets in graphic design

When playing games with mobile devices the screen is viewed close so the graphic designers should pay attention to the details of the graphics. Unlike smart phones, tablets cannot be used with one hand only unless the tablet is placed on a table or supported by something else. When designing graphics for a game, the way the gaming device is held during playing should be considered. If the game is played by both hands, it can be hard to reach buttons if they are situated in wrong places.

Hands also come in many sizes. If the game targeted to children, it is important to remember that their fingers cannot reach as far as adults. The game graphics should also be usable regardless of the player's handedness: if the player wants to play the game with the right hand or the left hand.

User interface elements should be placed on the screen so the player's hands and fingers are not in the way of the gameplay. A good choice is to minimize the amount of the user interface (UI) elements on the screen or hide some of them if they are not essential for playing the game. Many mobile games can be played with only one finger tapping anywhere on the screen to perform actions - these games are called one-tap games. This way the player can change the location of the tapping depending on what is happening in the game.

4.2.4 Special requirements of graphics in Crashnastics

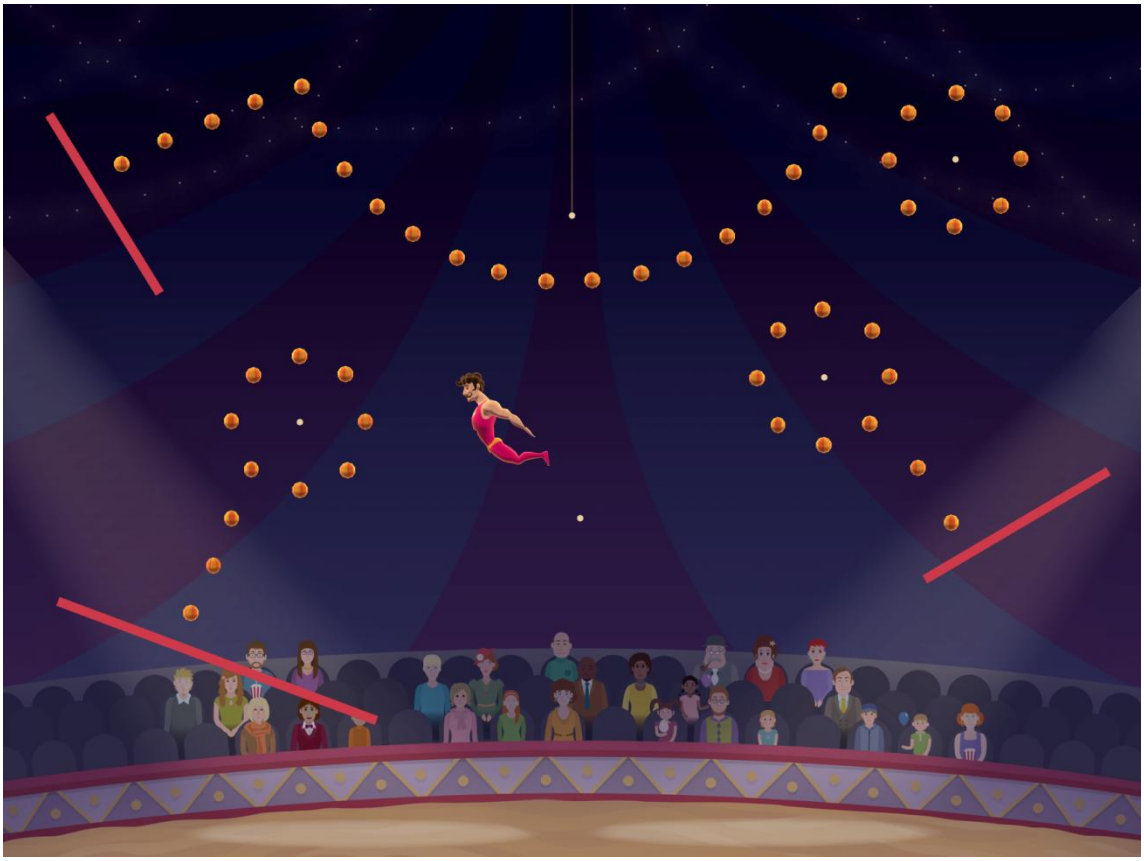
In Crashnastics the graphics are full of details and make use of the large screen sizes of tablets. Because tablet games are viewed close, I concentrated on making every detail of the graphics look good.

All graphics, except for the main character, are done in vector graphics. The background is designed in a way that it supports the safe zone method described in chapter 4.2.1 so it can be used in different aspect ratios. The test version of the game does not have a menu, but when it is added, the menu icon will be anchored to the upper right corner of the absolute screen. As the background is done in vectors, it can be scaled to match the high density displays. For possible future uses, it can also be printed out in high quality.

Crashnastics is a one tap game, so there is no problem with accuracy during the gameplay. There are no buttons and the player can tap anywhere on the screen, preferably the bottom part of the screen. Considering the target group of casual gamers, it is good to have simple controls and so players with different skill levels can enjoy the game. In the future, when the game will have menus, accuracy and sufficient button size will be more topical.

5 TESTING CRASHNASTICS

Crashnastics is a one-tap physics circus arena game for one player for tablet devices. In the game the player controls a trapeze artist and performs different tasks in a circus arena filled with trampolines, bars and swings. The objective of the game is to reach all the checkpoints or collect a certain amount of collectables. (Picture 3.) In this game project I was the artist. I designed the game together with a programmer.



PICTURE 3. Screenshot of Crashnastics (H. Härkönen 2015)

The game is a one-tap game so the controls are simple. While hanging from a bar or a swing, the gymnast uses his body to gain momentum under an AI control to spin around a pole. The player can press anywhere on the screen to make the gymnast release his grip on a pole and try to reach another pole, swing or a trampoline. If the playable character misses and falls to the ground, the player has to start again from the beginning of the level.

The target group for the game is casual tablet gamers. As the average use sessions of tablets can be short, under ten minutes at a time, the game is fast paced and the play sessions are short. The purpose of the game is to offer fun entertainment for the whole family.

5.1 Test basis

Play tests were organized to find answers to two main questions: have I, as the graphics designer of the game, managed to awake the feelings and emotions that I intended to with my graphics, and does the immersion in the gameplay happen? To find out the result I interviewed the participants and analyzed their play sessions.

In these tests I used contextual interview as an interviewing method. Opposed to being in a laboratory, the interviewer watches and listens as the users use a product in their own environments. The results and material collected from contextual interviews are usually qualitative, rather than quantitative, measured data. (Usability.gov 2015.) They are usually less formal and in that way more suitable to play testing as playing games is a leisure activity and not performed in labs under normal conditions. During contextual interviews the researcher can ask questions, but in my case, I decided to let the test subjects concentrate on the playing and ask questions later.

An interviewer should seem as neutral as possible towards the product, in this case the game, and put aside all hopes about the test and fears of failure. Before I began the tests, I emphasized that I would not be hurt by negative feedback and that it would be crucial for the future development of the game to hear those critical opinions as well. In an interview it is good practice to start with more general questions to warm up the interviewee and proceeded to more detailed ones. It is also good to end the interview with a wrap-up question that brings the interview to an end. (Kuniavsky 2003, 117-121).

As stated earlier in chapter 3.1 it is important to start testing early on, and I had tested the earlier demo versions of our game with friends and relatives. This time the programmer added the graphics, which lacked from the previous versions. I wanted to

conduct the tests with a vertical slice of the game; fully operational with polished graphics of a couple of levels of the game. Unfortunately, all of the graphics were not finished in time for the tests and the poles and trampolines were temporary graphics.

Even though I received a lot of useful data about every aspects of game usability through the tests, in my thesis I am going to mainly concentrate on and analyze the graphics of the game and the things I can affect as a graphic designer in the future development of the game.

5.2 Test progression

The tests were conducted at homes or work places of the test subjects and lasted from 15 to 20 minutes. When the tests were done in home environments, the test subjects chose a cozy place to sit, an armchair, sofa or a chair at a kitchen table, and play the game. At work places the environment was a silent office room and the tests were made at a work desk. I wanted to record the sessions, so I could watch them later and analyze the footage with more detail.

I lead the test and began by explaining what was going to happen during the testing. I also asked permission to record the session with my phone. I did not give the participants any information about the game beforehand or that I was mostly interested testing the graphics of the game. That way the reactions would be less considered and more genuine.

I gave the participants time to play the game and encouraged them to speak their mind and think aloud. One level was made available for playing for the test. The goal of the player was to collect all the balls on the screen without falling to the ground.

After the test subjects had played for approximately ten minutes I asked them to stop playing and moved to the interview part of the test. There were ten questions in total (see Appendix 1). At the end of the interview I thanked the participants for their time and effort.

5.2.1 Test subjects

As we did not have a specific target group, just that the game is targeted to people who like playing casual games on tablets, I wanted to have test players with different backgrounds and ages. This helped me to narrow down the target group. Previous experience in games and the gaming devices used varied amongst the players (table 1).

I had two usability experts taking part in the tests as test subjects. They did not give an expert evaluation of the game and went through the same test procedure as the other test players. Their feedback and comments were more professional in the field of usability and brought more insight to the results.

TABLE 1. Sex, age and background of the test subjects

Sex	**Age**	**Previous experience with games**
Female	30	Some experience in games, but had not played in a while at the time of the test. In the past she has played multiplayer online games, strategy games and casual card games.
Male	55	Sometimes likes to play strategy and puzzle games with his tablet. He also owns an Xbox and occasionally plays competitive car games and other sports games with it. He also plays Tetris a lot.
Female	29	Likes to play casual games on her smart phone. Her favorite genres are match-three and puzzle games. She has also played other types of games, for example Minecraft.
Male	30	Plays games several hours a day. He likes to play action and strategy games on his PC, but also some casual games on his smart phone. In addition to video games, he likes to play board and card games.
Female	39	Plays games once in a while. These days she mostly plays different kind of casual games on her tablet, for example match-three and puzzle games. In the past she has played some PC-games and games for Commodore 64.

5.3 Designing graphics for Crashnastics

Keeping the target group of casual gamers in mind, the graphics are simple, colorful and easy to approach. As people from all age groups play casual tablet games, the graphics are designed to be suitable for all age groups. To ease the immersion, I included circus stereotypes in the graphics. People associate circus with circus acts like trapeze artists, who perform daring stunts in the air. When people think of a circus, they instantly vision a classical circular fenced arena filled with sand surrounded by an audience in a tent made with striped fabric. Colors associated with circus are bright and vivid.

To ensure good usability, it is important to make the game elements stand out clearly from the background. Therefore the background is made with dark cool colors and the game elements the player interacts with bright warm colors. The character has a bright outfit to make him stand out of the background.

The playable character is a 3D model and not vector graphics like rest of the graphics. The later stages of the game will benefit of the fact that the character can be seen from different angles. It is also easier to animate the character for advertisement video clips and teasers later on.

To enhance the playing experience, some particle effects will be added to improve the graphics. For example the sand base of the circus arena can puff some dust in the air, or the collectables can emit some glow when collected. For our test version these effects were not yet added.

5.4 Test results

5.4.1 Overall reception

Overall the test subjects reacted to the game very positively and the test sessions were filled with laughter. The players were very immersed in the game and sometimes cried out spontaneously when they hit the ground and rejoiced when they managed to do

something well. Many of the players told that they were surprised how fun and entertaining the game was and really liked it.

Even though the test subjects enjoyed playing the game, almost all of them said it was a bit too hard. Some of them blamed themselves and that they were not skilled enough in games. That affected the gaming experience negatively. Many of the players suggested beginning the game with easier levels and gradually making it more challenging. That is what we had planned for the finished game. For the play test I thought it would be better to have a level that is a bit too hard than a level that is too easy, because with a difficult level the problems would be spotted easier. A better choice would have been to have several levels for the test, which would have grown more difficult gradually. Some of the test subjects did not mind the challenge and they enjoyed it. Some said it was frustrating, but also that if they first had had easier levels, the rising difficulty level would not have been a problem.

Four out of five of the test subjects said that the game was fun and entertaining and pointed out controls were simple and easy to learn. The players who had told that they do not play much were especially surprised how easy it was to learn the controls and get into playing the game. One of the players thought that the game was a bit boring, frustrating and not rewarding enough because of the difficulty, but pointed out that he did not like games of the same genre in general. Others commented that the game was captivating, addictive, fun and easy to get absorbed in, and wanted to keep on playing.

The test subjects thought that there were a lot of unexpected and surprising things happening in the game. Sometimes the playable character did not go were the player wanted him to go and the situations ended either with good or bad results. Some test subjects thought that the unpredictability was hilarious, but other found it frustrating. In the future development of the game we need to think how to find the balance of being surprising, but predictable enough to avoid the feeling of not being in control.

The game did not have any sounds yet and some of the test subjects made sound effects themselves as they played the game. When the character flew in the air they would say something like "wee" or "swoosh" and when the character hit the ground they would say something like "thud" or "ouch". Even the test subject, who said that he did not like the

game that much, laughed a lot and made noises while playing. I think that making noises while playing is a good indicator on how immersed the player is in the game.

5.4.2 Character graphics

I wanted to make the playable character likeable, sympathetic and funny. I tried to bring forth these qualities by making the proportions of the character anatomically incorrect; he has a big head, which can also make a character more sympathetic, big nose, large upper body and tiny butt. He also has a tuft of hair and curly vintage moustache to give him personality. (Picture 4.)

PICTURE 4. Close up of the playable character swinging on a pole (H. Härkönen 2015)

The most common adjectives the test subjects gave to describe the character were: muscular, flexible, athletic, funny, sympathetic and masculine. Many of the test subjects thought on the pink tights on the character were fabulous, cool and hilarious and commented on his moustache and hair. They also said that they liked the comical and caricature style of the character. Some of the players commented that they really could

not see the details on the character, while he was spinning, but paid attention to them when he was lying on the ground.

Some of the players identified strongly with the character. One of the players even said "I'm sorry strongman!" when he fell to the ground. When asked did the character awaken any feelings or emotions, many answered that they felt sympathy for him and that they felt sorry when he smashed to the ground. Two of the test players said that the character did not make them feel anything specifically, but that it did not really matter to them.

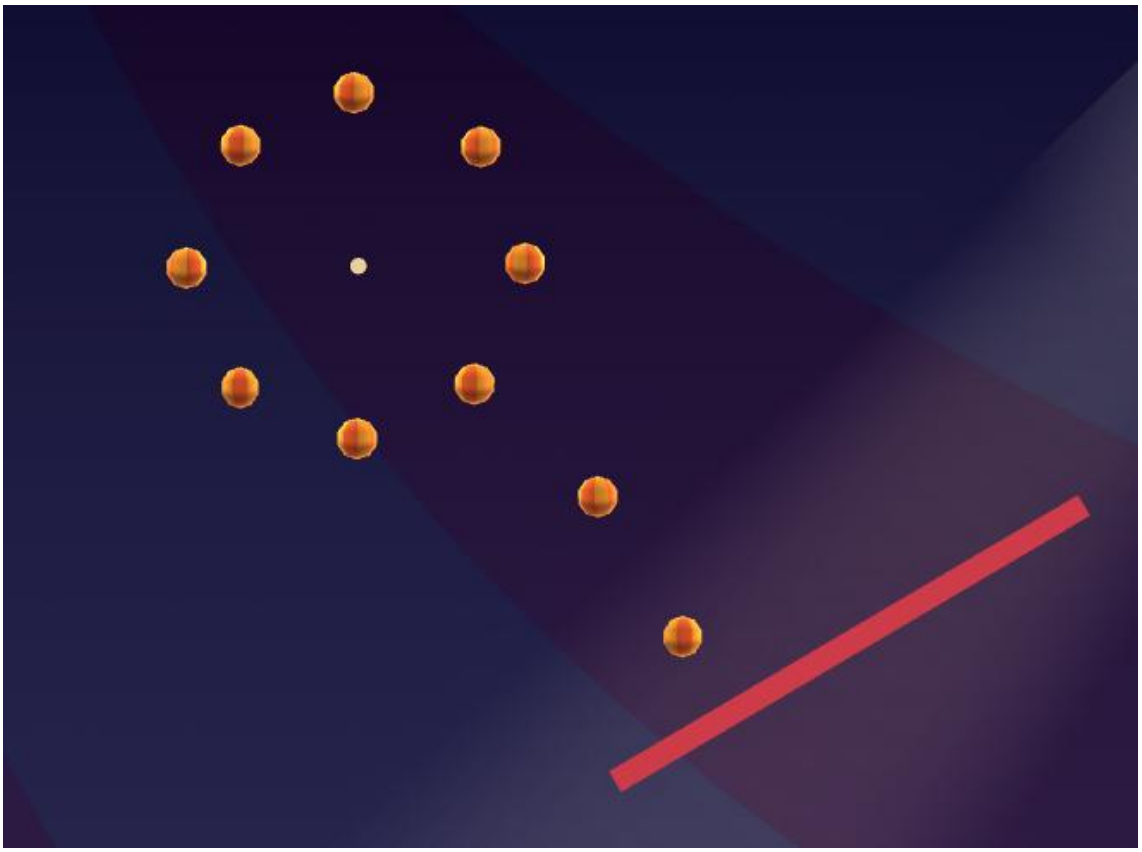
Smashing to the ground was perceived very amusing, entertaining and comically brutal. When asked, the test players did not seem to mind the violent falls and found them funny, even though some identified with the character. One of the testers said that it is good that the character is not too likeable, because if he was, he would feel too bad for him when he fell to the ground. One of the test players pointed out that she thought the falling down was funny as long as it was cartoon violence and did not include, for example, splattering blood.

All of the test subjects commented that the fluid movement of the character looked really good and convincing. Some said that how the character flew through the air and how he grabbed the trapezes felt satisfying. All in all the players felt really good about the movement, thought it was fun, and complimented it a lot during playing. It was encouraging to hear the feedback at the time of the tests, because the character movements were not yet fine tuned to the final quality.

In the test version of the game, the character can only be seen in the actual play situation and only from the side view. The character will be better introduced in the opening screen and menus, which were not yet implemented, where he will be part of the illustrations. In the future these images will help to further develop and deepen the personality of the character as he is seen in more detail in different situations. When it comes to the character, based on the feedback acquired from the tests, I think he does not need to be changed.

5.4.3 Game element graphics

The main goal for the game elements - balls, trapezes, poles and trampolines - is to be as usable as possible, because they are the objects the player interacts with. Unfortunately, for the test version of the game all of these elements were not finalized. The poles and trapezes are just one colored dots and the trampolines are a red bars (picture 5). I was interested on what the test subjects would say about the poles and trampolines as they were temporary graphics and not the finalized ones.



PICTURE 5. Close up of a trampoline, a pole and collectable balls (H. Härkönen 2015)

The trampolines did not look like actual trampolines and the test subjects wondered what they could do with the red lines before they tried them out. As soon as they had bounced off one of them, every test players started to call them trampolines. This was an interesting observation, because the side view of the trampoline cannot be remarkably different from these red bars. In my plans the trampoline will have a tightened stretchy fabric and when colliding with the trampoline the fabric is seen stretching along with the character. This will further help to develop the illusion of a trampoline.

The size of the poles was often commented. The test players did not realize at first that the small dots on the screen were poles, even though the game started with the character hanging from one of them. When they tried out the game, they eventually understood that the dots were poles and that they could grab them. Even after realizing this two of the players said that the poles were too small and hard to see, for the others it was not a problem. The test subjects really liked the way the poles bent with the weight of the character and commented that it felt nice. The size and noticeability of the poles is a usability problem that needs to be solved in the game for the future versions.

Even though the players were told that the goal of the game is to collect all the balls, they called the balls with different names, for example coins and grapes. Clearly the balls did not look like juggling balls enough as the players did not make that connection. The problem might be the yellow color of the balls, which can remind the players of coins, which are classic collectables in games. One of the test subjects wished that the collectables would be something more imaginative related to the circus theme, like clown masks or pins. Many of the players asked if there would be something different to collect in the future. This is something that needs to be considered in the future of the game.

It is clear that these elements need further development and more work. Even though the graphics were not finalized at the time of the tests, the gathered opinions gave a direction where to take the development next and new ideas.

5.4.4 Background graphics

I wanted the background graphics to be detailed, but still simple, playful and colorful (picture 6). It was challenging to find a balance between these qualities and that the player would not pay too much attention to the background. It was also important that the players would instantly recognize and associate the play area as a circus arena.

PICTURE 6. Close up of the background graphics and the audience (H. Härkönen 2015)

The background did not evoke any strong feelings with the test players. All of them associated the environment with circus immediately because of the audience, the arena and the stripes in the tent fabric in the background. Common comments were that it looked nice, simple and clean, and they acknowledged that it was there, but did not pay any attention to it during playing the game. Some of the test players commented on some details they had noticed in the background, like people having popcorn or cotton candy in the audience. On the base of these statements, I assume I had found the balance in the background between having interesting details and not being too distracting.

The atmosphere was described as hazy and atmospheric and circus-like. The players also commented that it was good that the tent was dark, so the balls and the character could stand out well.

All of the test players pointed out that they would like the audience to do something. They said that they would like the audience to applaud and cheer when they succeeded doing something and that it would be awarding. One of the test subjects questioned if the audience is at all interested what the character is doing. Making the audience animated and reacting to the things happening in the game has been our intention from the beginning of the development of the game, but these features did not make it into

the test version in time. The test results verified that these features are something we definitely need to include in the game.

5.4.5 Target group

I asked the test players their opinions of the game's target group to help us define it further. The answers confirm the thoughts we had about the target group.

The test players said that they think the game is targeted for someone who wants short periods of fun and entertainment, for example to prevent boredom. Many of the test subjects compared the game to some other casual games and said that it is for someone who likes to play those games. One test subject specified that the game is for players who like to play physics based games in general. The main message in the answers was that the game is for casual entertainment and not a larger-than-life experience.

All in all the game was perceived to be targeted to younger people and children, not to very old players. However, it was also pointed out that due to the simple controls that are easy to learn, it can be targeted to players in all age groups.

5.5 Future development of the game

In chapter 6.1 I presented two questions I was looking answers to in the tests. The first one was: Have I managed to awake the feelings and emotions that I intended to with my graphics? The graphics were indented to be funny, enjoyable, simple and pleasant. Simply put, to make the player feel good. Most of the test players felt joy when playing the game and commented that it was funny and entertaining. Also the laughter I heard through the play tests confirm that I had managed to do what I intended with my graphics.

The second question I wanted to find answers to was: Does the immersion in the gameplay happen? The players associated the game world as a circus arena immediately. They referred to the graphic elements with correct names; trampolines,

poles, trapeze artist, circus arena, circus tent and audience. Many of the players liked to play the game and wanted to continue playing when it was time for the interview. For the immersion in the gameplay to happen, the player needs to be interested in the game and needs to want to play the game. This was not the case with one of the test players and the immersion did not happen. The test subject himself said that he clearly was not a member of the target group.

Some usability problems that were detected in the tests were not graphics related, but some were (table 2). The trampolines and poles need to be further developed to make the game experience more enjoyable. Frustrations in the difficulty of the game were not caused by the graphics.

Prior to these play tests I had never done play testing and it was interesting and the data gathered was helpful. Many of the things the test players told me resonated with the thoughts we had about the game. Still, there were some usability problems that would not have been found without play testing. It might be, as the test subjects knew the game they tested was in fact made by me, that the opinions were biased in my favor. Further testing is needed with test subjects with no connections to the game or the testers. Because the game was tested with adult players, I think it is important to test it with teenagers and children next.

TABLE 2. List of graphics related problems based on the tests.

Problems related to the character	Spinning of the character is so fast, the players cannot see the details of the graphics.		
Problems related to the game elements	Poles are not recognizable. Poles are too small and hard to see.	Trampolines are not recognizable at first.	Collectable balls are not recognized as juggling balls.
Problems related to the background	Audience in the background is immobile.		

6 CONCLUSIONS AND DISCUSSION

The aim of this thesis was to find out how game graphic artists can enhance the user experience in games and increase the playability with their graphics. Game user experience is a collaboration between many different professionals, but the role of a graphic designer is the most visual and thus crucial.

The main goal of games is to offer entertainment and experiences. After my research I came to a conclusion that when assessing game usability, satisfaction in the gameplay is the most important quality attribute, following with immersion and emotion. To be able to enhance the play experience when designing graphics for a game, the graphic designer needs to understand these attributes, because those are the ones that he/she can influence the most. The graphics need to be aesthetically pleasing to bring satisfaction to the player. They also need to support the immersion in the game and bring out the right emotions.

In addition to the quality attributes, the graphic designer needs to understand what the target group of the game is and on which devices it is played on. Understanding the target group means knowing what kind of graphics the players belonging to that group like to see. Above all the graphic designer needs to master the basic principles of graphics design as that is the base of good graphics user experience.

For my thesis project I designed graphics for a tablet game named Crashnastics. I wanted the game to be enjoyed by casual gamers from all age groups, so I made the graphics simple, colorful and easy to approach. For background research I gathered information on tablet devices and tablet users. I also looked into the special requirements tablets have when it comes to designing graphics for them.

The aim of the thesis was also to find out if game graphics can be tested. To test the success of the graphics I made for Crashnastics I chose to combine play testing and user interviews. I compiled the interview questions from the perspective of a graphic designer to answer if I had managed to create an atmosphere I was after and evoke the feelings I wanted. As games are created for entertainment, I also wanted to know if my graphics helped the game to be entertaining and enjoyable. The main goal of the tests

was to define if the graphics were able to create a user experience they were designed for.

Play tests and interviews both had their benefits; the other revealed things the other did not. The play tests revealed more practical problems relating to usability and the interviews more problems concerning the overall user experience. In the interviews I was able ask more about the problematic situations the players faced in the play tests. A time saving option might be to ask questions while the player is playing the game. This might work better with slow paced games with more content. In my opinion, while testing the graphics of Crashnastics, it was better to do the play tests and interviews separately so the players could concentrate on playing without distractions.

The smart way to do play testing as an indie developer is to organize them yourself. With minimum budgets, or no budget at all, there is little point in paying a user experience agency to conduct the tests. With effort and studying anyone can learn to do simple usability or play tests. Doing the tests and interviews myself was very rewarding. It was nice to connect with the players and get firsthand information about the game and the graphics. The benefits of outsourcing the testing are saving time and getting an opinion that is unbiased. It can be hard to cut all emotional bonds to your own game and to take in all the critique while testing.

The testing of graphics does not necessarily need to be a part of every graphic designers work and not every artist is willing to spent their time on it. Play testing in itself is highly recommendable and the testing should be started early in the development. The graphics testing is good to start when the graphics are well underway, but still in a phase where changes based on the test results can be made. Of course the best way is to integrate the graphics testing with other play testing and not do it separately. As a graphic designer I think that every graphic artist should want to hear feedback about their work to improve their skills as professionals. So if a graphic designer does not want to be a part of the testing process, he/she should be interested in the results and take part in analyzing them. For example when watching recorded videos of the play test sessions, a graphic designer can spot graphic related problems the other designers might miss.

When planning the tests and interviews the graphic designer or other person conducting the graphics testing needs to be clear on what kind of feelings and atmospheres the graphics are meant to create. It is preferable to test finished graphics, but unfinished can be tested to some degree as well. For example in my tests I got good feedback about the unfinished game elements. It is important to stay neutral towards the game and the feedback during testing, and keep an open mind. Some problems might not seem to be graphics related at first, but further analysis can reveal that with improving the graphics they can be resolved.

When deciding on the interview questions, open ended questions are better than closed ones to find out what the testees think about the graphics. Open ended questions also give the testees room to think for themselves and more objective answers can be acquired. When asking questions the tester needs to pay attention to his/her own behavior and not ask leading questions. That is, the tester should prefer questions like "what did you think about the character?" over "did you think the character was funny?" The tester should also pay attention to the things that are not said directly; reactions and sounds the players are making when playing the game are important to analyze as well.

In my thesis I tested graphics that were near finished quality. An interesting research subject would be how to use testing as a tool from the very beginning of the development of graphics. How to effectively test graphics that are still in progress or is that even important? Would that be something helpful when designing graphics or would it become something that extinguishes creativity?

The play test sessions with interviews proved out to be a good combination for finding the user experience problems and successes in the graphics. The tests proved to be relatively easy to carry out even for very small game development group. The data gathered in the tests confirmed the right choices I had made and also brought forth problems in the graphics and gave good guidelines for future development.

LIST OF REFERENCES

Anthony T. 2012. Finger-Friendly Design: Ideal Mobile Touchscreen Target Sizes. Smashing Magazine. Published 21.2.2012. Read 19.4.2015. http://www.smashingmagazine.com/2012/02/21/finger-friendly-design-ideal-mobile-touchscreen-target-sizes/

AppBrain. 2015. Most popular Google Play categories. Updated 8.1.2015. Read 8.1.2015. http://www.appbrain.com/stats/android-market-app-categories

Appia. 2014. Four Challenges Facing Mobile Game Developers. Blog post. Released 24.2.2014. Read 2.2.2015. http://www.appia.com/blog/four-challenges-facing-mobile-game-developers

Atkinson, P. 2008. A bitter pill to swallow: the rise and fall of the tablet computer. Design issues 24(4), 3-25.

Bromley, S. 2012.User Research in Games. Published 2012. Read 15.2.2015. http://www.paulolyslager.com/user-research-games/

Collins, J. 1997. Conducting In-house Play Testing Released 7.7.1977. Read. 29.3.2015 http://www.gamasutra.com/view/feature/131619/conducting_inhouse_play_testing.php

Creativebloq. 2013. Hover is dead, long live hover. Blog post. Released 16.4.2013. Read 19.4.2015. http://www.creativebloq.com/design/hover-dead-long-live-hover-4132957

Danova, T. 2014. The Phablet Phenomenon: Trends And Growth Forecast For The Device That Is Taking Over Mobile. Business Insider. Released 10.6.2014. Read 8.1.2015. http://www.businessinsider.com/the-phablet-phenomenon-trends-and-growth-forecast-for-the-device-that-is-taking-over-mobile-sai-2014-6?IR=T

Dobson, E. 2011. Opinion: Some Hows And Whys Of Usability Testing. Published 4.8.2011. Read 30.3.2015. http://www.gamasutra.com/view/news/36344/Opinion_Some_Hows_And_Whys_Of_Usability_Testing.php

ESA. 2014. Millions of Americans Embrace Video Games on Mobile Devices. Released 25.9.2014. Read 5.1.2015. http://www.theesa.com/article/millions-americans-embrace-video-games-mobile-devices/

Farago, P. 2012. The Truth About Cats and Dogs: Smartphone vs Tablet Usage Differences. Released 29.10.2012. Flurry. Read 22.12.2014. http://www.flurry.com/bid/90987/The-Truth-About-Cats-and-Dogs-Smartphone-vs-Tablet-Usage-Differences#.VLAIgiusV8E

Federoff, M. 2002. Heuristics and Usability Guidelines for the Creation and Evaluation of Fun in Video Games. Read 23.3.2015. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.89.8294&rep=rep1&type=pdf

Frank N. Magid Associates. 2013a. Smartphones and Tablets: The Heartbeat of Connected Culture. Read 9.1.2015. http://magid.com/sites/default/files/pdf/20130930MagidMobileStudyPreview.pdf

Frank N. Magid Associates. 2013b. Tablets Preferred For Mobile Games (Magid research). Released 12.7.2013. Read 9.1.2015. http://www.magid.com/node/254

Gartner. 2014. Gartner Says Sales of Tablets Will Represent Less Than 10 Percent of All Devices in 2014. Press Release. Released 15.10.2014. Read 21.12.2014. http://www.gartner.com/newsroom/id/2791017

González Sánchez, J. L., Padilla Zea, N. & Gutiérrez, F. L. 2009. Playability: How to Identify the Player Experience in a Video Game. Read 26.3.2015. http://dl.ifip.org/db/conf/interact/interact2009-1/SanchezZG09.pdf

Grall, J. 2015. Playtesting Mobile Games at the DMV. Published 23.2.2015. Read 30.3.2015. http://www.gamasutra.com/blogs/JonGrall/20150223/237049/Playtesting_Mobile_Games_at_the_DMV.php

Hämäläinen, O. UX designer. 2015. Group discussion and interview. 28.5.2015. Interviewer Härkönen, H. Tampere

IDC. 2014. Fueled by Back-to-School Promotions and US Growth, the Worldwide Tablet Market Grows 11.5% in the Third Quarter, According to IDC. Press Release. Released. 30.10.2014. Read 21.12.2014. http://www.idc.com/getdoc.jsp?containerId=prUS25225114

iphoneate.com. 2012. Fruit Ninja HD 1.8.2 (315). Page visited 25.3.2015. http://iphoneate.com/fruit-ninja-hd-1-8-2-315

Joos, T. 2013. Beyond The Button: Embracing The Gesture-Driven Interface. Smashing Magazine. Published 24.5.2013. Read 19.4.2015. http://www.smashingmagazine.com/2013/05/24/gesture-driven-interface/

Kuniavsky, M. 2003. Observing the User Experience : A Practitioner's Guide to User Research. Morgan Kaufmann Publishers.

Laitinen, S. 2005. Better Games Through Usability Evaluation and Testing. Gamasutra. Released 23.6.2005. Read 15.2.2015. http://www.gamasutra.com/view/feature/130745/better_games_through_usability_.php

Leinonen, K. Principal designer. 2015. Group discussion and interview. 28.5.2015. Interviewer Härkönen, H. Tampere

Luban, P. 2011. The Design of Free-To-Play Games: Part 1. Gamasutra. Released 22.11.2011. Read 20.3.2015. http://www.gamasutra.com/view/feature/6552/the_design_of_freetoplay_games_.php

Madigan, J. 2010. The Psychology of Immersion in Video Games. Published 27.7.2010. Read 7.5.2015. http://www.psychologyofgames.com/2010/07/the-psychology-of-immersion-in-video-games/

Müller, H., Gove, J. & Webb, J. 2012. Understanding Tablet Use: A Multi-Method Exploration. Google, Inc. Read. 5.1.2015. http://static.googleusercontent.com/external_content/untrusted_dlcp/research.google.com/en//pubs/archive/38135.pdf

Mytechknowspace. 2014. Smartphone, Tablet or Phablet — Which is the Right Choice? Released 6.10.2014. Read 2.1.2015. http://mytechknowspace.com/smartphone-tablet-phablet-right-choice

Newzoo. 2013. Free Casual Games Association Sector Report: Smartphone & Tablet Gaming 2013. Released 27.11.2013. Read 19.4.2015. http://www.newzoo.com/insights/cga-smartphones-and-tablets-2013-games-market-sector-report/

Newzoo. 2014. Global mobile games revenues to reach $25 billion in 2014. Released 29.10.2014. Read 5.1.2015. http://www.newzoo.com/insights/global-mobile-games-revenues-top-25-billion-2014/

Nielsen, J. 2012. Usability 101: Introduction to Usability. Published 4.1.2011. Read 20.3.2015. http://www.nngroup.com/articles/usability-101-introduction-to-usability/

Nielsen, J. 2011. iPad Usability: Year One. Published 23.5.2011. Read 30.3.2015. http://www.nngroup.com/articles/ipad-usability-year-one/

Nofziger, H. Platform, not gender, drives gamer differences - EEDAR. Gameindustry.biz. Released 30.10.2014. Read 5.1.2015. http://www.gamesindustry.biz/articles/2014-10-30-platform-not-gender-drives-gamer-differences-eedar

Pocketgamer. 2015. Current Active Application Count By Category. Read 5.1.2015. http://www.pocketgamer.biz/metrics/app-store/categories/

Rogowsky, M. 2014. Headache Coming On? Apple's Phablet Could Be Just The Remedy It Needs. Forbes. Released 18.6.2014. Read 5.1.2015. http://www.forbes.com/sites/markrogowsky/2014/06/18/apple-180-absolutely-phablet-why-the-iphone-lineup-is-growing/

Salesforce. 2014. 2014 Mobile Behavior Report. Downloaded 5.1.2015. http://www.salesforce.com/marketing-cloud/resources/reports-and-whitepapers/

Schroeder, J. & Broyles, B. 2013. AndEngine for Android Game Development Cookbook. Packt Publishing.

Techopedia. 2015a. Free To Play (F2P). Read 20.3.2015. http://www.techopedia.com/definition/27039/free-to-play-f2p

Techopedia. 2015b. Mouseover. Read 19.4.2015. http://www.techopedia.com/definition/2842/mouseover

Techterms. 2011. Tablet. Read 29.3.2015. http://techterms.com/definition/tablet

Torbochkin, B. 2013. Using Gestures in Mobile Game Design. Published 18.11.2013. Read 19.4.2015. http://www.gamasutra.com/blogs/BeckyTorbochkin/20131118/205079/Using_Gestures_in_Mobile_Game_Design.php

Urbain, B. 2008. Pro Game Dev Tips: Play Testing. Published 3.6.2008. Read 26.3.2015. http://www.gamecareerguide.com/features/503/pro_game_dev_tips_play_.php

Usability.gov. 2015. Contextual Interview. Read 23.5.2015. http://www.usability.gov/how-to-and-tools/methods/contextual-interview.html

V-Play. 2015. How to create mobile games for different screen sizes and resolutions. Read 30.3.2015. http://v-play.net/doc/vplay-different-screen-sizes/

Wenderlich, V. 2012. Five Ways to Deal With the Longer iPhone 5 screen. Published 21.11.2012. Read 30.3.2015. http://www.gameartguppy.com/four-ways-to-deal-with-the-longer-iphone-5-screen/

APPENDICES

Appendix 1. Interview questions for the play tests

Question 1:
How did you feel while playing the game? (Why?)

Question 2:
What did you like about it?

Question 3:
What did you dislike about it?

Question 4:
With what adjectives would you describe the playable character?

Question 5:
What emotions did the character make you feel? / How did you feel about the character?

Question 6:
What kind of feelings did the environment evoke in you?

Question 7:
Is there something specific you took note of in the background or the graphics in general?

Question 8:
What did you think about the audience in the background?

Question 9:
Who do you think this game is targeted to? (Why?)

Question 10:
Is there anything else you would like to say about the game or this session in general?